

AMENDMENTS TO THE SPECIFICATION:

Please amend the paragraphs beginning at page 4, line 3, and continuing to page 5, line 23, as follows:

A general object of the present ~~invention~~technology is to achieve more efficient header compression. A specific object is to provide mechanisms for flexible header compression with regard to compression modes. Another object is to enable easily implemented header compression schemes.

~~These objects are achieved in accordance with the attached claims.~~

Briefly, the present ~~invention~~technology achieves more efficient header compression by means of a mechanism that allows a compressor to reject a request from a decompressor for an undesirable mode change. According to the proposed method, the compressor indicates, preferably by implicit or explicit signaling, towards the decompressor that the mode change request is being rejected/ignored. In response to this indication the decompressor may thereafter abort the initiated transition, with the understanding that the compressor has valid reasons to refuse the mode transition. If the decompressor is aware of the indicated rejection, it responds by a rejection acknowledgement action, implying a successful rejection. The rejection acknowledgement action can for instance involve decreased retransmission frequency or ceased retransmission of the mode change request, or an explicit rejection acknowledgement message. The compressor preferably determines whether the rejection was successful by monitoring and interpreting the decompressor signaling behavior and in case of a successful rejection the compressor remains in its current mode.

Preferred embodiments of the ~~invention~~technology achieves explicit rejection signaling by sending a mode change rejection message with a redefined mode value from the compressor to the decompressor, and implicit rejection signaling by intentionally ignoring the requests for a predetermined period of time. There may also be embodiments with combined explicit and implicit rejection signaling.

Thus, by means of the messaging method according to the present ~~invention~~technology a header compressor can either safely ignore a request from the decompressor or explicitly signal rejection of the mode change request. This makes it possible for the compressor to disable the transition to a particular mode if preferred considering different factors, including some unknown to the decompressor. It also enables compressor implementations that only support a subset of all operation modes for header compression. In particular, advantageous U/O-mode only implementations that are consistent with the ROHC specifications can be provided.

According to other aspects of the ~~invention~~technology, a communication system and a header compressor unit are provided.

Header compression in accordance with the present ~~invention~~technology offers the following advantages:

- improved header compression efficiency
- efficient use of available bandwidth
- reduced implementation footprint
- reduced memory requirements
- less functionality to implement, validate and test
- improved implementation time and cost
- more easily deployable ROHC products
- widespread mode-specific (e.g. U/O) implementations.

Please amend the paragraphs beginning at page 5, line 31, and continuing to page 6, line 9, as follows:

Fig. 1 is a schematic block diagram illustrating an exemplary communication network, in which the present ~~invention~~technology can be used;

Fig. 2 illustrates a header compression mechanism, in which the present ~~invention~~technology can be used;

Fig. 3 is a flow chart of a header compression method according to a first exemplary embodiment of the present invention; and

Fig. 4 is a flow chart of a header compression method according to a second exemplary embodiment of the present invention.

Please amend the paragraphs beginning at page 6, line 13, and continuing to page 7, line 6, as follows:

Fig. 1 is a schematic block diagram illustrating an exemplary Global System for Mobile communication/General Packet Radio Service (GSM/GPRS) communication network, in which the present invention technology can be used. A radio network comprising a number of mobile stations/terminals 10, such as mobile phones, laptops and wireless relays, communicating with a Base Station Subsystem (BSS) over wireless links 11 is shown. The BSS typically contains/comprises a large number of Base Transceiver Stations (BTS) 12 and Base Station Controllers (BSC) 13. Each BTS serves the mobile terminals within its respective coverage area and several BTS are controlled by a BSC, which in turn provides access to the core network, comprising a Mobile Switching Center (MSC) 14 and a Gateway Mobile Switching Center (GMSC) 15. GSM traffic is routed through the MSC 14, which is associated with a Visitor Location Register (VLR) responsible for the current location of a mobile terminal 10. Communication to and from external networks is handled by the GMSC 15. Turning to the packet-switched subnetwork, it comprises a Serving GPRS Support Node (SGSN) 16 and a Gateway GPRS Support Node (GGSN) 17. GGSN acts as an interface towards external packet data networks, while SGSN is responsible for packet delivery to and from terminals within its service area.

In practice, most networks comprise multiple network nodes arranged in much more complex ways than in the basic example of Fig. 1. Moreover, Fig. 1 is an example of one type of communication system in which the present invention technology may be used. The invention technology is also applicable on other packet data communication

networks, including e.g. cdma2000 wireless packet data communication networks as well as systems using other radio technologies for wireless IP such as Wlan.

Please amend the paragraph beginning at page 7, line 24, and continuing to page 8, line 4, as follows:

In Fig. 2, the general principle of header compression is illustrated. A header compressor unit 20 and a header decompressor unit 22 are shown. These units 20, 22 communicate over a link with a forward channel (from compressor to decompressor) as well as an optional feedback channel. Besides the actual data/payload, each IP packet input to the header compressor unit ~~consists of~~ comprises a header portion (in Fig. 2 represented by a striped field) with source and destination addresses, error checking, port and protocol fields, etc. The header portion often constitutes a larger portion of the packet than the data. Forwarding the complete packet would thus require large bandwidth and therefore the packet is compressed by eliminating redundant header information in the header compressor unit 20 before being transferred over the bandwidth-limited link (11 in Fig. 1). The header decompressor unit 22 reconstructs the packet into a decompressed packet substantially identical to the original input packet.

Please amend the paragraph beginning at page 10, line 15, and continuing to page 10, line 18, as follows:

The present ~~invention~~ technology aims at offering a solution that removes the restriction placed by the ROHC algorithm towards the compressor implementations to always and absolutely support all modes of operation even when it may be needed or desirable to support only a subset.

Please amend the paragraph beginning at page 11, line 15, and continuing to page 11, line 22, as follows:

Instead, the present ~~invention~~technology proposes a messaging procedure in which the compressor can indicate towards the decompressor that a mode change request is being rejected. In response to this indicated rejection, the decompressor may then abort the initiated transition with the understanding that the compressor has valid reasons to refuse the mode transition. Such reasons can for instance be that the compressor has better knowledge of the link conditions, that the compressor is optimized for the current mode of operation, and/or that the requested mode is not available.

Please amend the paragraph beginning at page 12, line 1, and continuing to page 12, line 18, as follows:

The present ~~invention~~technology thus allows a compressor to either implicitly or explicitly reject a mode change request from a decompressor. This makes it possible for the compressor to disable the transition to a particular mode and even removes the need for compressors to implement all modes of operation.

To illustrate the principles of the ~~invention~~technology, a first and a second embodiment thereof will now be described with reference to Fig. 3 and 4. The examples mainly address mode transition from U- or O-mode to R-mode and are based on the above-described compressor behavior when initiating a mode transition request. However, embodiments with other mode change requests (concerning ROHC modes as well as other header compression modes of operation) also lies within the scope of the ~~invention~~technology. Any request for a mode transition from a first header compression mode to a second header compression mode can thus be handled in accordance with the ~~invention~~technology, for example a request to/from modes selected from the group of a unidirectional (U) mode, a bidirectional optimistic (O) mode, a bidirectional reliable (R) mode and a bidirectional (B) mode.

Please amend the paragraphs beginning at page 13, line 18, and continuing to page 14, line 2, as follows:

It is to be understood that the present ~~invention~~technology also covers embodiments using other mechanisms for explicitly signaling (in-band or out-of-band) to a decompressor that a mode change request will be ignored. Thus, instead of the preferred ROHC mode value redefinition, other bits/values can be used for the explicit signaling, including a special packet type, another bit flag than the mode bit, an option within the packet format, an option within an extension, etc.

Fig. 3 is a flow chart of a header compression method according to an exemplary embodiment of the present ~~invention~~technology with explicit rejection signaling. In step S1, the header decompressor unit initiates a mode transition and transmits a request for a change to a new mode to the header compressor unit over the packet transfer link. In case the mode transition involves a change to the R-mode, for example, the compression mode of the request is set to MODE=3 (R-mode). The decompressor then stays in its current mode and waits for a confirmation from the compressor. For each packet received until the confirmation, the decompressor resends the request over the feedback channel.

Please amend the paragraph beginning at page 14, line 24, and continuing to page 15, line 4, as follows:

The compressor preferably determines whether the rejection was successful through interpreting the signaling behavior of the decompressor. Generally, this involves monitoring the packet transfer link in search for some kind of indication that the rejection has been understood and acknowledged by the decompressor. This indication can be the above rejection acknowledgement message. Alternatively, the indication that the mode change request rejection was successful can ~~consist in that~~comprise the compressor stops sop receiving mode change requests with the new mode over the feedback channel with high confidence that the signal has reached the decompressor. Sufficient certainty would normally require at least 1 link Round-Trip Time (RTT), and typically in the range of 1-2

RTT. In response to a successful rejection, the compressor continues using the current mode (step S6).

Please amend the paragraph beginning at page 16, line 4, and continuing to page 16, line 11, as follows:

Another advantage is that a method according to this embodiment of the invention technology remains interoperable and compliant to the standard when a compressor supporting all modes but preferring the U/O-modes is used together with a decompressor implementation unaware of the proposed redefinition. A decompressor that does not understand this redefinition will simply ignore this value, as per the ROHC specifications. The compressor may then resort to the implicit signaling below or honor the mode change request.

Please amend the paragraph beginning at page 17, line 1, and continuing to page 17, line 8, as follows:

Fig. 4 is a flow chart of a header compression method according to an exemplary embodiment of the present invention technology with implicit rejection. As before, the header decompressor unit initiates a mode transition and sends a mode change request to the header compressor unit (step S10). The decompressor stays in its current mode and waits for a confirmation from the compressor. For each packet received until the confirmation, the decompressor resends the request over the feedback channel.

Please amend the paragraphs beginning at page 19, line 4, and continuing to page 19, line 29, as follows:

In summary, the present invention technology allows a header compressor to reject a mode change request from a header decompressor and continue using the current mode of operation if deemed appropriate considering different factors, including factors not

known to the decompressor. It also enables compressor implementations that only support a subset of all operation modes for header compression. In particular, by means of the invention technology, it is possible to create efficient U/O-mode only implementations while still conforming entirely to the ROHC specification [4].

The invention technology removes compressor dependencies towards the decompressor with respect to mode transitions. This results in better header compression efficiency, and may also reduce the memory requirements, implementation time and implementation cost. By the explicit signaling approach especially, a more efficient use of the available bandwidth is achieved, without adverse impacts on receiver or application behavior and operation. Furthermore, the invention technology enables less complex and streamlined implementations of ROHC, such as implementations that only use the U- and O-modes.

Although the invention technology has been described with reference to specific illustrated embodiments, it should be emphasized that it also covers equivalents to the disclosed features, as well as modifications and variants obvious to a man skilled in the art. For example, even though the invention technology has been exemplified for ROHC (RFC3095 [4]), it may also be applied to other header compression schemes, including schemes associated with other modes of operation than the described examples. The scope of the invention is only limited by the enclosed claims.